Verification of Environmental Monitoring Technologies

Technology Profile: Optical Open-Path Monitors

Brief Description

Optical open-path monitors are used to provide information about pollutants present in the air. They can continuously monitor air quality and allow early warning of potential non-compliance conditions or emergency release situations. In contrast, "grab sample" analysis by standard methods is both time-consuming and non-continuous. The verification testing involved challenging these monitors with gas samples under realistic operating conditions. The monitors verified rely on a light source (ultraviolet, visible, or infrared) and a detector used together to identify and quantify the levels of certain chemicals in the atmosphere. These monitors can be used to continuously monitor the quality of the air, and, in many cases, are able to simultaneously monitor for several different pollutants.

How is this important to environmental protection?

Because optical open-path monitors can continuously monitor the air for atmospheric pollutants, they can be valuable tools for detecting air pollution and providing an early warning of potentially serious air pollution or safety problems. Continuous monitoring of emissions from sources of air pollution is important both for increasing the efficiency and safety of industrial processes and for controlling emissions to the environment. Optical open-path monitors can help facility owners and operators meet their need for both regulatory compliance and improved monitoring accuracy.

What federal regulatory program does this interface with?

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality standards for six air pollutants: ozone, lead, carbon monoxide, sulfur dioxide, NO_2, and respirable particulate matter. The standards were established to protect the public from exposure to harmful amounts of pollutants.

Optical open-path monitors completing verification testing

The ETV Advanced Monitoring Systems Center has verified two optical open-path monitors, the SafEye 227 and the SafEye 420, developed by Spectrex, Inc. of Cedar Grove, NJ. The SafEye systems provide detection capabilities of gas/vapor concentrations ranging from parts per million (ppm) to lower explosive limit levels.

Models SafEye 227 and SafEye 420

Spectrex Inc.
218 Little Falls Road
Cedar Grove, NJ 07009
Web: www.spectrex-inc.com/safeye
E-mail: spectrex@spectrex-inc.com
Phone: 973-239-8398

Optical open-path monitors previously verified:

AR-500 Open-Path Monitor
OPSIS, Inc.
San Marcos, CA

Lasir TDL Open-Path Monitor, Controller, Telescope and Retroreflector
Unisearch Associates
Concord, Ontario, Canada

GasFinder 2.0 TDL Open-Path Monitor
Boreal Laser, Inc
Spruce Grove, Alberta, Canada

AIL RAM 2000 FTIR Open-Path Monitor and Retroreflector
AIL Systems, Inc.
Deer Park, NY

Additional optical open-path monitors can be verified for other vendors.

General Market Information

Who would use this technology? Who would buy it?

Open-path monitors are versatile and can be used to monitor many chemical species in ambient air from a variety of settings. Industries where these monitors may be used include aluminum, steel, cement, glass, power generation, and natural gas. In general, these instruments may be used to monitor emissions from sewage and waste treatment plants, pulp and paper production, fossil fuel combustion, agricultural waste, fertilizer production, incinerators, specialty gas production, and auto exhaust.

Why are companies having these instruments tested?

Manufacturers and vendors of optical open-path monitors choose to participate in the verification tests to gain additional credibility and more widespread acceptance for their instruments. The verification reports and verification statements signed by EPA and Battelle senior officials aid in marketing their products. In addition to the official recognition of a company's participation in the ETV program, an ETV stand and disk will be given to vendors participating in the testing and those having completed verification tests, respectively. These items can be used at conferences and other venues in conjunction with displays of the instrument. Vendors with open-path monitors interested in ETV verification should contact Battelle.

General Test Information

How are EPA and Battelle Involved?

The EPA's Environmental Technology Verification (ETV) program was established to accelerate the entrance of improved environmental technologies into domestic and international markets through third-party verification testing and reporting of the technologies' performance. The ETV program provides purchasers and permitters with an independent assessment of the technology they are buying or permitting and facilitates multi-state acceptance. Battelle is EPA's partner in managing the Advanced Monitoring Systems (AMS) Center, whose objective is to verify the performance of commercially ready monitoring technologies for air, water and soil. Battelle, a not-for-profit technology research and development organization, designs and conducts the tests with vendor and stakeholder involvement.

What are the factors verified in the test?

- Minimum detection limit
- Concentration linearity and source strength linearity
- Accuracy
- Precision
- Sensitivity

The test procedures provide a range of known concentrations of various target gases to each monitor. Measurements are made with different path lengths (the distance the light travels from the source to the detector), integration times, source intensities, and numbers of replicated measurements to assess the verification parameters listed above. The generic test protocol, verification test reports, and statements for the optical open-path monitors are available on the ETV web site at http://www.epa.gov/etv.

How long does the testing take?

For each instrument, the testing covered three days and looked for three separate gases. The monitors from Spectrex were tested for benzene, carbon disulfide, ammonia, methane, ethane, and a mixture of hydrocarbons.

For more information, contact:

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